IN THE CLAIMS

1. (currently amended) A compound structure for reduced contact resistance to a silicon-containing material, comprising:

a first refractory metal material overlying and adjoining the silicon-containing material, wherein the first refractory metal material is a conductive material containing a first refractory metal and a first impurity capable of forming a chemical bond with the first refractory metal; and

a second refractory metal material overlying the first refractory metal material, wherein the second refractory metal material is a conductive material containing a second refractory metal and a second impurity capable of forming a chemical bond with the second refractory metal;

wherein the first refractory metal material contains the first impurity at a level less than a stoichiometric level; and

wherein the second refractory metal material has a lower affinity for the first and second impurities than does the first refractory metal material.

2. (original) The compound structure of claim 1, wherein the first impurity is the same as the second impurity.

3. (original) The compound structure of claim 1, wherein the first and second refractory metals are each selected from the group consisting of chromium, cobalt, hafnium, molybdenum, niobium, tantalum, titanium, tungsten, vanadium and zirconium.

4. (original) The compound structure of claim 1, wherein the second refractory metal material can serve as an impurity donor to the first refractory metal material during an anneal or other exposure to heat and wherein the first and second impurities are each selected from the group consisting of boron, carbon, nitrogen and oxygen.

5. (original) The compound structure of claim 4, wherein the first impurity is the same as the second impurity.

6. (currently amended) A compound structure for reduced contact resistance to a silicon-containing material, comprising:

a first refractory metal material overlying the silicon-containing material, wherein the first refractory metal material is a conductive material containing a first refractory metal and a first impurity capable of forming a chemical bond with the first refractory metal; and

a second refractory metal material overlying the first refractory metal material, wherein the second refractory metal material is a conductive material containing a second refractory metal and a second impurity capable of forming a chemical bond with the second refractory metal;

wherein the first refractory metal material contains the first impurity at a level less than a stoichiometric level;

wherein the second refractory metal material has a lower affinity for the first and second impurities than does the first refractory metal material;

wherein the second refractory metal material can serve as an impurity donor to the first refractory metal material during an anneal or other exposure to heat and wherein the first and second impurities are each selected from the group consisting of boron, carbon, nitrogen and oxygen;

wherein the first impurity is the same as the second impurity; and

~~The compound structure of claim 5,~~ wherein the second refractory metal material contains the second impurity at a level higher than a stoichiometric level and wherein the first refractory metal material contains the first impurity at a level less than a stoichiometric level.

7. (currently amended) A compound structure for reduced contact resistance to a silicon-containing material, comprising:

a first refractory metal material overlying the silicon-containing material, wherein the first refractory metal material is a conductive material containing a first refractory metal and a first impurity capable of forming a chemical bond with the first refractory metal; and

a second refractory metal material overlying the first refractory metal material, wherein the second refractory metal material is a conductive material containing a second

refractory metal and a second impurity capable of forming a chemical bond with the second refractory metal;

wherein the first refractory metal material contains the first impurity at a level less than a stoichiometric level;

wherein the second refractory metal material has a lower affinity for the first and second impurities than does the first refractory metal material;

wherein the second refractory metal material can serve as an impurity donor to the first refractory metal material during an anneal or other exposure to heat and wherein the first and second impurities are each selected from the group consisting of boron, carbon, nitrogen and oxygen;

wherein the first impurity is the same as the second impurity; and

~~The compound structure of claim 4,~~ wherein the first refractory metal is different from the second refractory metal.

8. (original) A compound structure for reduced contact resistance to a silicon-containing material, comprising:

a first refractory metal nitride layer overlying the silicon-containing material, wherein the first refractory metal nitride layer is an unsaturated refractory metal nitride material; and

a second refractory metal nitride layer overlying the first refractory metal nitride layer, wherein the second refractory metal nitride layer has a lower affinity for nitrogen than the first refractory metal nitride layer.

9. (original) The compound structure of claim 8, wherein the first refractory metal nitride layer has a bulk resistivity within 5% of its unsaturated maximum bulk resistivity and wherein the second refractory metal nitride layer contains a saturated refractory metal nitride material.

10. (original) The compound structure of claim 9, wherein the first refractory metal nitride layer contains a different refractory metal than the second refractory metal nitride layer.

11. (original) The compound structure of claim 8, wherein the first refractory metal nitride layer is produced using an ionized metal plasma process.

12. (original) The compound structure of claim 11, wherein the ionized metal plasma process uses a titanium target, a bias power of approximately 0-500W, a coil power of approximately 100-3000W, a nitrogen flow rate of approximately 5-25 sccm, an argon flow rate of approximately 10-50 sccm, and a deposition time of approximately 3-10 seconds.

13. (original) The compound structure of claim 11, wherein the ionized metal plasma process uses a titanium target, a bias power of approximately 300W, a coil power of approximately 2800W, a nitrogen flow rate of approximately 13 sccm, an argon flow rate of approximately 40 sccm, and a deposition time of approximately 6 seconds.

14. (original) The compound structure of claim 8, wherein the first refractory metal nitride layer has a thickness of approximately 20-120Å.

15. (original) The compound structure of claim 8, further comprising a refractory metal silicide interface between the silicon-containing material and the first refractory metal nitride layer.

16. (original) The compound structure of claim 15, wherein the refractory metal silicide interface is limited to a lower portion of the first refractory metal nitride layer.

17. (original) A compound structure for reduced contact resistance to a silicon-containing material, comprising:

a first refractory metal nitride layer overlying the silicon-containing material, wherein the first refractory metal nitride layer has a refractory metal component and wherein an atomic ratio of nitrogen to the refractory metal component of the first refractory metal nitride layer is less than one; and

a second refractory metal nitride layer overlying the first refractory metal nitride layer, wherein the second refractory metal nitride layer has a lower affinity for nitrogen than the first refractory metal nitride layer.

18. (original) The compound structure of claim 17, wherein the first refractory metal nitride layer has a bulk resistivity within 15% of its unsaturated maximum bulk resistivity and wherein the second refractory metal nitride layer has a refractory metal component such that an atomic ratio of nitrogen to the refractory metal component of the second refractory metal nitride layer is greater than or equal to one.

19. (original) A compound structure for reduced contact resistance to a silicon-containing material, comprising:
a titanium nitride layer overlying the silicon-containing material, wherein the titanium nitride layer is formed by reactive sputtering from a titanium target in a nitrogen-containing ambient to produce an unsaturated titanium nitride material having a bulk resistivity within 15% of a maximum unsaturated bulk resistivity; and
a refractory metal nitride layer overlying the titanium nitride layer.

20. (original) The compound structure of claim 19, wherein the refractory metal nitride layer is a tungsten nitride layer.

21. (original) The compound structure of claim 20, wherein the tungsten nitride layer is a nitrogen-rich tungsten nitride layer.

22. (previously presented) A structure for providing ohmic contact to a silicon-containing layer in an integrated circuit, comprising:
a first refractory metal material overlying the silicon-containing layer, wherein the first refractory metal material is a conductive material containing a first refractory metal and a first impurity forming a chemical bond with the first refractory metal;
a first refractory metal silicide interface formed between the first refractory metal material and the silicon-containing layer; and

a second refractory metal material overlying and adjoining the first refractory metal material, wherein the second refractory metal material is a conductive material containing a second refractory metal and a second impurity forming a chemical bond with the second refractory metal;

wherein the first refractory metal material contains the first impurity at a level less than a stoichiometric level; and

wherein the second refractory metal material has a lower affinity for the first and second impurities than does the first refractory metal material.

23. (previously presented) The structure of claim 22, wherein the first and second impurities are each selected from the group consisting of boron, carbon, nitrogen and oxygen.

24. (previously presented) The structure of claim 23, wherein the first refractory metal material further comprises an additional impurity forming a chemical bond with the first refractory metal.

25. (previously presented) The structure of claim 24, wherein the additional impurity is silicon.

26. (previously presented) The structure of claim 22, wherein the first refractory metal is different from the second refractory metal.

27. (previously presented) The structure of claim 22, wherein the second refractory metal material contains the second impurity at a level higher than a stoichiometric level.

28. (previously presented) A structure for providing ohmic contact to a silicon-containing layer in an integrated circuit, comprising:

a first refractory metal nitride layer overlying the silicon-containing layer, wherein the first refractory metal nitride layer is an unsaturated refractory metal nitride material;

a first refractory metal silicide at an interface between the first refractory metal nitride layer and the silicon-containing layer; and

a second refractory metal nitride layer overlying and adjoining the first refractory metal nitride layer, wherein the second refractory metal nitride layer has a lower affinity for nitrogen than the first refractory metal nitride layer;

wherein the first refractory metal nitride layer is formed to have a bulk resistivity within 15% of its unsaturated maximum bulk resistivity.

29. (previously presented) The structure for providing ohmic contact of claim 28, wherein the first refractory metal nitride layer is formed to have a bulk resistivity within 5% of its unsaturated maximum bulk resistivity.

30. (previously presented) The structure for providing ohmic contact of claim 28, wherein the first refractory metal nitride layer is formed to have a bulk resistivity approximately equal to its unsaturated maximum bulk resistivity.

31. (previously presented) A structure for providing ohmic contact to a silicon-containing layer in an integrated circuit, comprising:

a titanium nitride layer overlying the silicon-containing layer, wherein the titanium nitride layer is formed by reactive sputtering from a titanium target in a nitrogen-containing ambient to produce an unsaturated titanium nitride material of the form TiN_x where x is in the range of approximately 0.2 to approximately 0.8;

a titanium silicide layer formed at an interface between the titanium nitride layer and the silicon-containing layer; and

a tungsten nitride layer overlying and adjoining the titanium nitride layer.

32. (previously presented) The structure for providing ohmic contact of claim 31, wherein the tungsten nitride layer is a saturated tungsten nitride material.

33. (previously presented) The structure for providing ohmic contact of claim 31, wherein the tungsten nitride layer has a lower affinity for nitrogen than the titanium nitride layer.

34. (previously presented) The structure for providing ohmic contact of claim 31, wherein x is in the range of approximately 0.4 to approximately 0.7.

35. (previously presented) The structure for providing ohmic contact of claim 31, wherein x is in the range of approximately 0.5 to approximately 0.6.

36-89 (canceled)